## REMARKS

Applicant's attorney wishes to thank the Examiner for the careful consideration given to this application. The matters raised in the action are discussed below in the same order as presented by the Examiner.

Initially, it is noted that a number of typographical errors have been corrected at pages 1, 9 and 10 in the specification. It is clear that these corrections do not raise issues of new matter.

The claims have been amended to more clearly define the invention and better distinguish the same over the prior art. Claim 1 has been amended to include the subject matter of original claim 8, and the latter claim has been deleted. Newly presented claims 10 - 24 include independent claims 11 and 19 which are also distinguished over the prior art as discussed below.

The rejection of claims 1 - 9 under 35 USC 112, second paragraph, as being indefinite, has been overcome by amendment. Specifically, the phrase "thermoplastic material" has been substituted for the objected-to phrase "other formable material" as suggested by the Examiner.

It is requested that the Examiner reconsider and withdraw the rejection of claims 1-9 under 35 USC 103(a) as being unpatentable over Vassarotti (European Patent No. 476,977) in view of the Abstract of Japan Patent No. 3197863. As discussed below in detail, amended claim 1 presents a number of distinguishing limitations that are not taught or suggested by the cited prior art.

Vassarotti does not teach or suggest "a tubular stem ... which defines in one piece said internal flow conduit" with the "permeable filter portion being integrally bonded to the front end of the tubular stem across the internal flow conduit". Vassarotti also fails to teach or suggest a plunger having "an outer plunger wall spaced outwardly from said tubular stem" and wherein "the outer plunger wall and tubular stem being integrally bonded to one another at the front end of the plunger so as to seal off an internal space of the plunger, around said tubular stem, at the front end thereof".

The foregoing structural deficiencies are not remedied by Japan '863. In fact, Japan '863 is specifically cited in connection with its inlet and outlet teachings.

It is convenient to consider the rejection of claim 8 based on the combined teachings of Vassarotti and Japan '863 as applied above and further in view of US patent 3,826,373 to Andreotti. The double-tube hollow plunger construction described by Andreotti, and shown in Figs. 1 to 3, is not part of a chromatography column per se and, in any event, it is distinguished from the claimed plunger construction.

In Andreotti's system, the chromatography column is the simple packed bed 35,36 shown at the lower right in figures 1 and 2. The cylinder/plunger construction 10 in the drawings is a liquid metering device for feeding liquid to the chromatography column. Therefore, although

this device is disclosed in an apparatus for chromatography, it would not have suggested to a skilled person any relevance to the construction of a plunger to be used in a chromatography column itself, i.e. having a permeable end filter element and designed to retain and feed sample to the top surface of a bed of chromatography material.

The liquid measuring device 10 comprises a vessel 11 having an inner bore 13 that receives a movable plunger 16. The plunger 16 is sealed to the adjacent bore wall by rings 20. The relative position of the plunger 16 within the bore 13 determines the volume setting of the measuring device.

For purposes of delivering a measured volume of liquid phase 29 to the column 35, the plunger 16 includes a central passageway 18 leading from an inlet nozzle 19 to the bottom thereof and connecting with the interior of the vessel 11. A syringe 32 having a plunger 33 is connected via valves 25 and 26 to draw liquid sample 29 from a reservoir 30 into the device 10. Thereafter, a liquid mobile phase conducted from a reservoir 38 into the device 10 causes discharge of the sample phase 29 from the device 10 through valve 26 into the column 35.

Accordingly, the passageway 18 and the plunger 16 in Andreotti are different from the claimed invention and operate in a different manner. The Andreotti plunger does not suggest the claimed plunger including "an outer plunger wall spaced outwardly from said tubular stem" and

wherein "the outer plunger wall and tubular stem being integrally bonded to one another at the front end of the plunger so as to seal off an internal space of the plunger, around said tubular stem, at the front end thereof".

Newly presented claim 11 is also distinguished over the cited art. More particularly, the cited art does not teach or suggest a "plunger comprising a tubular glass stem which defines said internal flow conduit, the permeable filter portion being a sintered glass element integrally fused to the plunger stem."

Claim 19 is distinguished by its plunger construction over the cited art. More particularly, the claimed plunger comprises "a tubular stem of glass or thermoplastic material which defines in one piece an internal flow conduit extending in the plunger ... to the permeable filter element ... the plunger's permeable filter element being of glass or thermoplastic material and integrally bonded around the front end of the plunger."

For completeness, it noted that Vassarotti teaches a plunger construction that is entirely different from that of the claimed invention. More particularly, the Vassarotti plunger does not include an outer plunger wall and does not teach integrally bonding the outer plunger wall and stem to form an internal space in the plunger. In Vassarotti, the filter unit at the end cell is incorporated into a piston 18 in a different manner. In

Vassarotti's column, the upper and lower end cells (20,10) each have a corresponding plastic mesh or screen (14,12). Each mesh disc (14,12) has its edge embedded in a solid plastic ring 22, as shown in Fig. 3. The solid plastic ring 22, made from the same plastics material as the end cell 10 (see Fig. 2 in Vassarotti) is much easier to weld around the periphery of the end cell 10 than would be the raw edge of the cut mesh.

There is little description in Vassarotti of the specific construction of the end cells and their connection to the corresponding inlet and outlet conduits. Indeed the openings to those conduits are not shown, as the Examiner observes. Fig. 2 shows the lower (fixed) end cell 10. It is clear from Fig. 1 that the upper end cell substantially corresponds. Specifically, Fig. 2 shows that the end cell is a discrete plastics disc, with a central socket and radial ribs on its rear side, the front side having a concave recess over which the mesh disc is secured.

The end cell disc is clearly shown in Fig. 2 as being secured onto the end of a discrete central tube; the tube end appears to fix into the central socket of the end cell by a screw thread. The plunger end cell in Fig. 1 looks similar. This is consistent with column 5 lines 7 to 10 of the Vassarotti document, which describe how the piston seal of the end cell is able to be released and tightened. The mechanism described apparently corresponds with the prior art mechanism

acknowledged in the present application from page 1 line 23 to page 2 line 20.

To summarize, the apparent construction of the Vassarotti device shown in Fig. 1 involves concentric inner and outer tubes of the plunger stem, one moveable relative to the other for control of the seal, a discrete piston casing 18 attached to the outer stem tube, and a discrete end cell component 20 attached to the inner tube.

Accordingly this construction appears susceptible to exactly the kind of internal leaks, adjacent the front end of the plunger, that the present invention can avoid. The present invention avoids them by making the plunger's internal flow conduit (which as defined in claim 1 communicates along the plunger between the filter element and the rear, exterior part of the plunger) in one piece of a tubular stem of glass or thermoplastic material. Vassarotti does not do this but has at least two discrete components.

As noted above, Vassarotti does not disclose that an outer plunger wall is integrally bonded to an inner tubular stem of the plunger. Vassarotti's piston casing 18, even if it is assumed to correspond with an outer plunger wall, is not integrally bonded to the tubular stem that forms the internal flow conduit. On the contrary, the two parts are discrete and separated by the resilient sealing ring.

For all of the foregoing reasons, claims 1-7 and 9 are distinguished over the cited art.

In addition to the reasons noted above, with regard to new claim 10, the above comments apply and also Vassarotti does not disclose the use of glass for the tubular stem and sintered glass for the permeable filter portion, the two being fused together.

In addition to the reasons noted above, with regard to independent claim 19, Vassarotti's column includes the conventional top end cover with a central small opening to guide the plunger stem. It does not describe or suggest a full-diameter opening at the top end, the plunger having an axially elongate outer construction engaging the tube wall so as to be self-aligning in the column tube. Further distinctions of claim 19 are as discussed above with reference to claim 1.

Turning to Japan '863, it also fails to describe integral bonding of the permeable disc 16 into the bottom end of the solid plunger 3 of the column. Furthermore, with reference to claim 1 the Japan '863 does not disclose the plunger construction involving an inner tubular stem and an outer plunger wall bonded adjacent front end. With regard to claim 11, Japan '863 does not disclose the use of fused glass for the stem and filter element.

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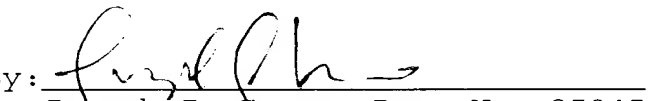
Respectfully submitted,

By: 
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